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ABSTRACT

The purpose of this study was to explore and develop baseline understandings of the purposes, character (i.e., cultural, teaching/learning, curricular practices), quality, and outcomes associated with doctoral education in four professional fields of study: clinical psychology, electrical engineering, nursing, and school administration. The analysis is based on 3 programs in each of these 4 fields and interviews with 148 stakeholders (faculty, administrators, students, and alumni). Through these interviews, five teaching and learning practices were identified that, from the perspectives of those interviewed, enrich students' doctoral experiences in ways that contribute meaningfully to learning and development. These areas are: (1) the problematization of professional knowledge and practice; (2) the use of relational teaching and learning throughout the doctoral experience; (3) an emphasis on integrative inquiry; (4) individualized mentoring of students; and (5) student engagement in authentic, research-based discovery activities. Taken together these five teaching and learning practices form a learning environment, a culture, that appears to value collegial and reciprocal engagement among faculty and students in a community of practice. (Contains 54 references.) (SLD)

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Learning Experiences that Make A Difference:

Findings from A National Study of Doctoral Education in the Professions

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Doctoral education in the United States is generally considered the best in the world. The more than 400 institutions that offer doctoral programs in this country play a critically important role in developing future generations of faculty, research scientists, and expert scholar-practitioners for business, industry, government, health care, educational, and cultural organizations. Over the past 15 years, the numbers of individuals completing doctorates in U.S. colleges and universities has increased steadily, growing from slightly under 32,000 degrees in 1985 to nearly 42,700 degrees in 1998 -- an all-time historical high (Magner, 1999).

Despite its influence and importance, as well as recent upswings in student demand for the doctoral degree, there has been relatively little scholarly interest in American doctoral education. A number of professional associations have recently inquired into doctoral education in their disciplines (Commission on Graduate Education in Economics, 1991; Howard, et al., 1986; Huber, 1993; Mayrl and Mauksch, 1987; Overman, Perry, and Radin, 1993; Payne and Brannen, 1990; Ziemer, et al., 1992), but only Bernard Berelson, in his 1960 study of graduate education, has systematically studied doctoral programs across fields of study in a range of institutions. This paucity of empirical scholarship recently led Derek Bok, a former president of Harvard University, to refer to graduate education (and doctoral education, in particular) as the "soft underbelly" of American universities (Bowen and Rudenstine, 1992).

Especially severe is the scant attention that has been paid to studying and understanding what goes on inside the "black box" of doctoral programs that contributes to student learning (Kuh, 1992, p. 354). Interestingly, there is very little empirical research that examines how various cultural,

instructional, and curricular practices within doctoral programs enrich students' doctoral experiences, let alone how they contribute favorably to student learning and development. The oversight of empirical work in this area is especially curious for two reasons. First, bearing in mind the deep human and financial investments that students, faculty, institutions, industry, government, and foundations make in doctoral education, it strikes us as odd that few scholars have systematically inquired into how different learning environments, instructional practices, and curricular requirements enrich or diminish doctoral students' learning. Second, there is no corresponding lack of empirical interest in this area at the undergraduate and, to a lesser extent, master's levels. In their landmark work, How College Affects Students, Pascarella and Terenzini (1991) synthesized more than 2,000 empirical studies on how various instructional, curricular, and co-curricular and other practices affected students' learning, while also reviewing studies that examined the overall impact that a college education had on students' intellectual, affective, and occupational outcomes. At the master's level, Conrad, Haworth, and Millar (1993) systematically explored how various cultural, pedagogical, curricular, and financial practices affected the kinds of experiences students had in master's programs, paying special attention to their impact on students' learning and development. Unfortunately, we were hard-pressed to find more than a handful of studies that examined, in narrow or broad strokes, the impact of doctoral study on students.

Partially in response to these gaps in the literature, as well as the lack of scholarly interest in doctoral education outside of traditional arts and sciences fields[1], we recently completed a national study of doctoral study in the professions. Supported in part by the Spencer Foundation, the overall purpose of this study was to explore and develop baseline understandings of the purposes, character (i.e., cultural, teaching/learning, curricular practices), quality, and outcomes (i.e., effects on students' learning and development) associated with doctoral education in four professional fields of study: clinical psychology, electrical engineering, nursing, and school administration. While we interviewed slightly more than 175 faculty, administrators, students, and alumni in 15 different doctoral programs overall, we have restricted our analysis here to 12 cases and the 148 stakeholders we spoke with in them (three programs in each of the four fields).

We address the following question in this paper: What teaching, learning, and curricular

practices do faculty, administrators, students, alumni, and employers believe "make a difference" in doctoral students' learning and development? For each practice we identify, we also address three key sub-questions: (1) How do faculty and administrators foster and enact the practice? (2) How does the practice enrich the doctoral experience for students? and (3) What positive effects does the practice have on students' learning and development?

Review of Related Literature

Although the literature is ripe with descriptive investigations that explore who pursues the doctoral degree, where, why, with what support, and for how long (see, for example, Baird, 1990a; Hauptman, 1986; Malaney, 1988, NRC, 1997), it contains far fewer analytical and evaluative studies that examine the experiences students have in doctoral programs once they enroll. Scholars have seldom probed inside the "black box" of doctoral programs to study (1) what kinds of experiences students have in them, (2) how various cultural, teaching, learning, and curricular practices enrich or diminish students' doctoral experiences, and (3) how different experiences and practices affect various outcomes, including time-to-degree, doctoral completion rates, and students' intellectual and psychosocial development.

That said, we reviewed a small number of studies that offered useful windows into how different practices affected doctoral students' learning experiences and outcomes. In the mid-1970s, for instance, Hartnett and Katz interviewed approximately 125 biochemistry, business, English, law, and psychology graduate students at two institutions in an effort to "identify and understand" how various practices within graduate learning environments enriched or diminished the "nature and quality" of students' graduate experiences (Harnett in Katz and Hartnett, 1976, p. 58). Interviewees repeatedly emphasized five key "dimensions" of the "graduate department social-psychological environment": (1) the nature of faculty-student relations, particularly faculty accessibility to students and "the extent to which students feel accepted and respected by members of the faculty"; (2) the extent to which faculty and students experienced a "sense of community or togetherness" in the department; (3) the seriousness with which faculty approached their teaching responsibilities; (4) the degree of commitment faculty had to retaining students to the degree and the frequency with which they offered constructive feedback on student

performance; and (5) the nature of curricular/degree requirements, including the extent to which students could design programs of study that addressed their individual needs and interests (Harnett, 1976).

Expanding on Harnett's findings, a small number of scholars have identified collegial peer relations and faculty mentoring of students as important practices in doctoral programs. Boyle and Boice (1998), in a qualitative investigation of "exemplary" graduate departments, identified collegial -- rather than competitive -- interactions among first year students and individualized, faculty-student mentoring as important practices for enculturating students. Their findings – especially those related to mentoring – are supported by others who have studied doctoral education more broadly (Berelson, 1960; Malaney, 1988, Baird, 1990a), as well as those who have examined specific practices contributing to doctoral persistence and time-to-degree (Bowen and Rudenstine, 1992; Girves and Wemmerus, 1988; Jacks, Chubin, Porter, and Connolly, 1983). Similarly, in their survey of nearly 2,000 chemistry, microbiology, civil engineering, and sociology students regarding their experiences in graduate school, Anderson and Swazey (1998) found that the majority of their respondents enjoyed an *espirit de corps* with their program peers, and 90 percent described graduate faculty as collaborative and accessible. Interestingly – and perhaps reflecting the collaborative, team-oriented nature of graduate study in the sciences and engineering – students in sociology were far less likely to assess their departmental climates positively, often describing them as individualistic and highly-competitive.

More recently, Nyquist, et al. (1999) completed a longitudinal study of 99 master's and doctoral students in eleven fields at two Research I and two Master's only institutions. While their research focused more on how the graduate school experience affected students' attitudes toward academe and the professoriate, one of their key findings -- students' experiences with faculty support and mentoring -- merits inclusion here. Generally speaking, the students in Nyquist, et al.'s study reported considerable dissatisfaction with the mentoring they had received, particularly in relation to their development as novice teachers. Their findings also suggest, in contrast to Boyle and Boice and Anderson and Swazey, that students felt isolated during their doctoral experience and desired more attention from faculty – many of whom, students believed, elevated their own research interests and productivity over those of their students.[2]

In terms of specific curricular practices, the dissertation has received the most attention. In a comprehensive study of graduate education he completed more than four decades ago, Berelson surveyed more than 1,800 graduate faculty and 2,300 recent doctoral recipients in 92 institutions and found that both research supervisors and alumni held the dissertation in high esteem, ranking it as "the most valuable part of [students'] doctoral training" (1960, p. 176). Other researchers in recent years – including Isaac (1990) and Isaac, Quinlan, and Walker (1992) – have conducted similar surveys of faculty and alumni and reached the same conclusion. Although dated, Berelson's research also identified "independent reading" and "course work" as "valuable aspects of the doctoral experience" (1960, p. 206).

The literature on the outcomes associated with doctoral study is quite robust in some areas, and distressingly sparse in others. Our review of the literature turned up numerous studies on time-to-degree and doctoral degree completion rates (Abedi and Benkin, 1987; AGS Task Force, 1990; Baird 1990b; Berelson, 1960; Bowen and Rudenstine, 1992; Cude, 1989; Hansen, 1991; Harmon, 1978; Lomperis, 1992; NRC, 1993; Nerad and Cerny, 1993; Stimpson, 1992; Tuckman, Coyle, and Bae, 1990; Wilson, 1965; Ziemer, et al., 1992). The vast majority of these scholars, however, limited their inquiry to examining how factors largely external to doctoral programs -- such as family status, financial support, and job market demand -- affected the dependent variables of interest. Only recently have scholars begun to look at how practices internal to doctoral programs may lengthen time-to-degree and completion rates (Bowen and Rudenstine, 1992; Nerad and Cerny, 1993). These researchers have found, for instance, that poor faculty advising and unrealistic faculty expectations for the dissertation are practices that extend student time-to-degree and often work against its eventual completion.

More alarming is the lack of empirical scholarship on how doctoral study affects students' intellectual and psychosocial development. We identified only a handful of studies that broadly examined changes in students as a result of their enrollment in graduate programs (Lozoff in Katz and Hartnett, 1976; Katz, 1976). For instance, Lozoff surveyed approximately seven hundred graduate students in the early 1970s and found that slightly over one-half believed their graduate experience had "made them more assertive, more skilled in problem-solving, less idealistic, less relaxed, and more nervous" (1976, p. 143). While her findings began to provide an understanding of how students change

as a result of their graduate experience, Lozoff did not examine the role that various practices played in contributing to these changes. By comparison, Katz -- whose discussion of the intellectual development of graduate students was somewhat cursory -- advanced several "conditions" he believed contributed mightily to the "development of the mind." Among others, these included regular attention and recognition of students from their professors; frequent dialogue and "exchange of ideas" among student peers and between students and faculty; collaborative inquiry to enhance broadened, critical awareness in students; "cultivation of the imagination" through multi- or interdisciplinary course work or "practical applications of what one knows"; and a "sequence of learning that is reasonably harmonious with one's own curiosity" (in order to develop and enhance intellectual autonomy in students) (Katz, 1976, pp. 120-21). Yet perhaps the best data we have currently on how graduate education affects students' learning and development can be found in the work of Baxter-Magolda. In 1986, she began what has developed into a 14 year longitudinal study, first interviewing students upon their entry into college. In recent years, Baxter-Magolda's research (1998, 1999) has led to the identification of a number of important epistemological and identity changes that occur in students after they complete college -- and often as a result of their participation in graduate programs. Most notably, she has found that students often make a shift from "transitional knowing" to "contextual knowing" while in graduate school, particularly when their professors respect them as learners and emphasize seminar approaches to instruction that encourage students "to process the readings and think about their implications" (1998, p. 52). Contextual knowers, she explains, view "knowledge relative to a context," understand that "some knowledge claims are more valid than others," and evaluate various sources of evidence when deciding what it is that they want to believe (Baxter-Magolda, 1998, p. 41).

Mode of Inquiry

The national study on which this paper is based incorporated a multi-case study qualitative design in which individual doctoral programs served as the unit of analysis, and multiple stakeholders (faculty, program administrators, students, alumni, and employers) were interviewed within each case. We used a positioned subject approach to inquiry that placed the perspectives of differently-positioned stakeholders

at a broad range of institutions squarely at the center of our research (Conrad, Haworth, and Millar, 1993).

Between June, 1998 and August, 1999 we conducted face-to-face and, on rare occasions, telephone interviews with nearly 150 stakeholders in twelve doctoral programs–three each in clinical psychology, electrical and computer engineering, nursing, and school administration[3]--at an equal number of institutions.[4] (See Table 1 for a distribution of interviewees by stakeholder group and gender.) With rare exceptions, within each program we interviewed two administrators (the department chair and graduate program director), two faculty (one junior and one senior), four to six students (two second-year students and two dissertators, each in separate focus groups), two recent alumni of the program, and one employer of program graduates. Interviews lasted between 60 and 90 minutes and were tape recorded and transcribed. We also collected and analyzed a variety of program and institutional documents (e.g., accreditation self-studies, program brochures, student handbooks, and statistical data on enrollment and job placement) for each program included in the study.

Table 1: Distribution of Interviewees by Stakeholder Group and Gender

	Female	Male	Totals
Administrators	9	14	23
Faculty	9	13	22
Students	37	29	66
Alumni	12	12	24
Employers	6	7	13
Totals	73	75	148

Our selection of doctoral programs was informed by several purposive sampling criteria. For starters, we sought to include programs that were broadly representative of the range of institutions (i.e., Carnegie types prior to the most recent re-categorization of institutions) that award doctoral degrees in this country. According to data obtained from the National Research Council and the National Center for Education Statistics, research universities confer approximately three-quarters of all doctorates in the United States, followed by doctoral-granting institutions (20 percent), master's institutions (1 percent),

Table 2: Characteristics of the Case Study Sample

Pseudonym Institution	Field of Study	Carnegie Type 1 = Research I 2 = Research II 3 = Doctoral-Granting	Control 1 = Public 2 = Private	Doctoral Program Size 1 = < 50 students 2 = 51 - 150 students 3 = > 151 students	Student Attendance 1 = Primarily Full-time 2 = Primarily Part-time 3 = Mix	Delivery System 1 = Traditional 2 = Non-Trad (Wkend/Sum) 3 = Satellite	Percentage of Minority & International Students 1 = > 30% 2 = < 29%	Program Prestige 1 = Top 10 2 = Top 25 3= Non-elite
Prestige State	clinical psych	1	1	2	1	1	1	1
Walker State	clinical psych	2	1	1	3	1	2	3
Mission U	clinical psych	3	2	1	3	1	1	3
Major State	electrical engineering	1	1	3	1	1	1	1
Cachet U	electrical engineering	1	2	2	1	1	1	2
Lakeview U	electrical engineering	3	2	2	3	1	1	3
Gotham State	nursing	1	1	2	1	1	2	1
City-State	nursing	2	1	1	3	1/2	2	2
Brooks U	nursing	2	2	1	2	1/2	2	2
Prairie State	school administration	1	1	2	3	1/3	1	2
Frontier U	school administration	3	2	3	2	2	1	3
Central State	school administration	2	1	3	2	1/2	2	3

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and specialty institutions (4 percent). While our sample included a significant percentage of research institutions (65 percent), it oversampled doctoral-granting institutions (35 percent) and did not include a specialty institution.[5] The programs included varied by other sampling criteria, including: student attendance patterns (full-time, part-time, mix), type of delivery system (traditional day/evening, nontraditional weekend/summer), percentage of minority or international students (high [greater than 30%] or low), and program prestige (elite [top 10], prestigious [top 25], or non prestigious, as defined by published reputational rankings). (See Table 2 for characteristics of the case study sample).

We used the constant comparative method (Glaser and Strauss, 1967) to analyze and identify emergent themes within and across each of the 12 programs included in the sample. Each interview was read by all members of the research team and coded in light of the following broad categories: program mission and purposes; program culture/environment; teaching, learning, and curricular practices; faculty and student perceptions of their roles and responsibilities; perceived attributes of program quality; doctoral student outcomes (intellectual, psycho-social, vocational) and "other" (to allow for emergent findings not easily classified into the previous categories). In addition, we developed individual program indices that summarized key themes within each of the aforementioned categories across interviews within each case. The research team met formally on several occasions to discuss and analyze transcripts and emergent findings. Throughout the data collection and analysis process, we sought to enhance the trustworthiness of our research findings through triangulation (multiple stakeholder groups, multiple investigators), the development of an audit trail (comprised of interview transcripts, relevant program documents, program indices, and methodological and analytical memos), and the use of negative case analysis in the coding of and verification of themes (Lincoln and Guba, 1985; Patton, 1990).

This paper draws on interview data that cuts across the categories of program culture/environment; teaching, learning, and curricular practices; and doctoral student outcomes. Specifically, our analysis generated five key themes, or practices, that stakeholders told us "made a difference" in enriching the overall character of students' doctoral experiences in ways that favorably affected their growth and development. Support for these themes was found in at least three of the five stakeholder groups (faculty, administrators, students, alumni, and employers) in no fewer than three-fifths

of the programs under study.

Practices that "Make A Difference"

We identified five teaching and learning practices that, from the perspective of those whom we interviewed, enriched students' doctoral experiences in ways that contributed meaningfully to their learning and development. As we came to understand, these practices pushed and stretched doctoral students in ways they often did not anticipate but nonetheless strongly valued. They include (1) the problematization of professional knowledge and practice, (2) the use of relational teaching and learning throughout the doctoral experience, (3) an emphasis on integrative inquiry, (4) individualized mentoring of students, and (5) student engagement in authentic, research-based discovery activities.

In this section, we draw on participants' narratives to illustrate these practices in rich detail. For each, we consider how faculty and administrators fostered the practice in their programs, examine how it enriched students' doctoral experiences, and discuss the positive effects that the practice had on students' learning and development.

Problematization of Professional Knowledge and Practice

In a considerable number of cases, stakeholders metaphorically referred to faculty in their programs as intellectual gadflies who prompted students to explore critically the nature of knowledge and practice in their fields. Through constant questioning, careful examination of assumptions, and a healthy skepticism of the status quo, these faculty "problematized" students' and others' understandings of various theories, methods, and practices in their professions. Students and alumni reported that this practice often greatly enriched their doctoral experiences, nurturing their development as more critically reflective thinkers.

Across our sample, the faculty who most often problematized knowledge in their classroom teaching were those who believed doctoral education should, in the words of a Prairie State administrator, educate students as "disciplined skeptics" capable of critically reviewing and revising theory and practice in their fields. Many were initially disheartened with the fairly uncritical and limited perspectives of their doctoral students, and had no reservations about "disrupting" them "intellectually." A City-State nursing

professor, for instance, unabashedly remarked that the "number one thing" she wanted to do in her classes was help students "learn not to accept the extant dogma as being the ultimate answer to all of their questions":

> I want them to be able to think, to challenge and, as a result, to be able to create new ideas. I help them learn that through modeling. In class I assume that they read what I assigned and we spend the entire time talking about it. My trying to lead them – sometimes painfully, hopefully not so painfully – that it is o.k. to question things . . . [that is a big task] because they have spent all their time to that point memorizing or highlighting. It is unfortunate from a curricular standpoint that you get to that level and [the faculty member has to] say it is o.k. to disagree with that and here is why. I don't think people have the skills they need to continue to grow unless they can do that. . . . We spend most of the class dealing with the nature of truth and all of that. Nursing has so many pad answers to all of its questions as does most fields. . . We will read something or take that statement and on the first day we will identify some of the dogma that we have. I more or less take them through the process of critiquing their own ideas and responses so they can apply it to what they read. The students get very confused. They thought they knew the answers and now they don't. . . . [Through this process of dialogue and critique] they learn how to think. [They learn to have] faith in themselves in recognizing that they can form an opinion and it might be a good one.

In much the same spirit, a Prairie State administrator told us that he preferred to "ground" beginning educational leadership doctoral students in a view of the "field as competing meta-narratives -- competing stories for their attention," rather than "start them off right into one meta-narrative": "This whole notion of being a disciplined skeptic [requires that students] know something about the whole evolution of the field itself . . . [and that they] be able to operate in a world which is far more ambiguous than they ever thought. . . . [That's difficult for them because] practice is largely grounded in one meta-narrative."

Faculty and administrators fostered critical perspectives on and discussions of professional knowledge through a number of instructional practices, including debates, seminar discussions, and socratic questioning. A faculty member in Prestige State's clinical psychology program provided this example of how he and his colleagues "problematized" knowledge in their courses:

> I try to stimulate the discussion and -- well, I'll give you an example. In the course I'm teaching right now, I organized a debate on the issue of randomized clinical trials. In other words, a lot of people in the field are saying that randomized clinical trials are the way to go, and that we develop empirically validated treatments [and] treatment guidelines that say "When you have depression, you treat them in the following ways based on clinical trials." [They say that] the results of those clinical trials should be the

> basis of our training in programs, and our administering therapy to the world. That's been very controversial; [some] people say clinical trials are very limited, they suppress innovation, there's been all sorts of controversy. So I organized a debate in the class. We read a whole set of arguments pro and con, and then they debated. . . . It went over well. They had fun with it. Some of them were forced to debate positions that they didn't necessarily hold themselves. . . . I think it's a good experience to have to argue a position that you don't necessarily believe, and get immersed in that argument. I saw the students actively involved, and interestingly involved in the material. We had a good discussion.
>
> Other faculty members will, and I've done this too, you assign readings, you get students to submit questions based on the readings, and there's class discussion around those questions. So that kind of active learning [where students are] no longer in the role of passive recipient of information, but an active consumer and discussion of information, is certainly the model that we subscribe to here.

Similarly, a faculty member in Cachet University's engineering program noted that in "every seminar" she teaches, she tells her students, "'This part I know is true but this part I am not sure.'" She then engages students in a dialogue about what is -- and is not – known, and challenges them to examine the assumptions that they -- and others -- are making about the problem at hand. "I get them to ask why -- Why do that?"

Across disciplines, students and alumni repeatedly stressed that they relished learning from faculty who helped them to "unpack" assumptions and explore alternative points-of-view on knowledge and practice in their fields. Many said that their most enriching courses were those in which professors invited them to participate actively in the teaching and learning process, often stimulating them to think in ways they had not previously.

Although she did not use our term, a student at City-State University provided a vivid example of how one of her nursing professors "problematized" knowledge for students in a research methods course. This professor's proclivity for "raising tough questions" and "forcing" students to "take a stand" proved invaluable to this student, who appeared to revel in thinking through and critically evaluating her ideas with others:

> Professor [Jones] this semester was really good about picking out key things so that you really had to do the readings. [She'd say to us] "This article, what did you think about it?" "Do you think she was clear enough about this?" It wasn't like you could bluff your way through it – you had to take a stand on it. . . . It wasn't just a "What did you like about this?" type of thing. It was really using the information there, using it and putting it together, and you really had to take stands, comparing this article to this article,

> or whatever the questions would be. "What did you see similar in these articles?" That was good. We also talked about what we were doing as far as our own individual projects and papers, and it was interesting to hear what other people were doing, what they were observing. That kind of sharing was very interesting. She'd talk about assumptions and propositions and things like that. You could see their assumptions and propositions, just in what they were saying. Sometimes you could see it in others easier than you could see it in your own.

A Mission University clinical psychology alumnus likewise fondly recalled how a few of his professors had engaged him in stimulating dialogues, prompting him to "think differently":

> I remember the ethics class and sitting down and talking about therapy and ethics. The teacher kind of facilitated the conversation and asked some hypothetical questions that we would all discuss with an encouragement that we would adhere to confidentiality but bring in case examples from our [practicum sites]. We would also do that in more the theory classes. . . . It wasn't lecture-ish at all. . . . From my experience as an undergraduate, it was unique. [There] I was used to reading something and then coming in and having somebody tell me what they thought rather than to come in and have somebody say "So, what do you think?" That was novel -- more respectful, I think -- and more challenging.

Other interviewees across our sample shared similar stories. An alumna of Central State's education program spoke appreciatively of a professor whose dialogical questioning in class had "stretched her," while a City-State nursing professor – who conducted her classes as problem-posing interactive seminars – told us that she often heard from "students several years after they had graduated" that their "experience [in her class] meant more to them throughout their education than anything else": "They really valued learning how to think, developing faith in themselves, recognizing that they could form an opinion and it might be a good one. . . . They wish[ed] more of their classes had involved the dialogue, the challenging, the arguing -- and how important that was for them."

Engaging students in interactive discussions in which professors – and, eventually, peers (see below) – problematized students' working assumptions and explored competing explanations favorably affected students' growth and development in one major way: it helped them to become more critically reflective professionals who thought "differently" about knowledge and practice in their fields.

Many faculty and administrators told us that as they questioned orthodoxies with students and invited them to explore alternative explanations, they noticed a substantial "shift" in students' thinking. A Gotham State administrator described this "shift" as a "transformation" in students, highlighting how many developed a "different way of looking at the world":

> They talk differently and they think differently. It has to do with the students' unwillingness to repeat stupid platitudes for things that are handed down wisdom. . . . That reflection and that critical analysis and that disrespect for authority I absolutely love and cultivate as much as I can. They all call me by my first name and tell me that I am full of it if they think so. . . . They get the message that they don't have to spout dogma or keep it to themselves if they disagree. What I am trying to do is promote intellectual openness and respect for different points of view. Which isn't to say that all these points of view aren't correct but let's put it on the table, examine it and decide where to go from here. This disrespect for authority and the irreverence especially on matters intellectual I think is critical. It is there [in these students]. I just absolutely love it. I am proud of them.

A Central State education professor similarly observed that the "study, reflection, and conversations" students engaged in with faculty typically "broke their provinciality," leading many to "internalize that it ain't like they say it is in the book":

> [They learn] that it's not as simple as the diagram suggested it would be. That once you get done with your PowerPoint overheads, and your last cup of coffee is drunk, there's still a huge amount of work lying there. What are some of the latent factors that weren't talked about that we have to be able to recognize? What are some of the unanticipated consequences that we must be alert to? That's the level of understanding you have to internalize.
>
> [Interviewer]: It sounds as though they begin to think differently.
>
> Oh, yes. I know that happens.

Many students and alumni corroborated these faculty accounts, crediting the animated discussions they had in their classes with helping them to think in ways that accentuated critical analysis and reflection. Two advanced students in Gotham State's nursing program, for example, said that their involvement in seminar discussions had led them to view knowledge claims more tentatively and critically:

> [Student 1]: I've sort of accepted that things are not cut and dry. . . I guess I feel more relaxed than I did, just accepting that there is a lot we don't know, and the things that looked so clear and absolute when I started the program, I now realize it was maybe framed by somebody and was their view, but not necessarily the whole view of the way it really is. And I can sort of say, "It's o.k." So it's been a very positive thing.
>
> [Student 2]: I feel like I've changed in a lot of ways. . . The positive side is that I look at everything in kind of a different way. Like [Student 1] was saying, I don't take things for granted. I mean, if somebody says, "The sky is blue," I don't necessarily believe the sky is blue. I'd look at it, you know what I mean. Even reading the newspaper, I do it a little bit differently. . . . If people say, "This is this way because of that," I say, "Well, that

> doesn't make logical sense necessarily." And then I say, "Oh, come on, get a grip!" But I almost can't even have a conversation with anybody without thinking more deeply. I guess I don't accept things at face value. And I used to. I mean, if somebody -- I used to like to do that. It was more comfortable for me, accepting the face value of things. "This is it," they'd say, and I'd say, "OK, this is it." But I'd go and I'd complain that "This is it." Now, nobody knows what's "it."

Recalling the discussions he had regularly with his professor and peers in research team meetings, a Lakeview engineering alumnus similarly remarked how his thinking had changed: "It's a different thought process [than when I entered the program]. I started to open up and look for different things – I questioned assumptions. . . . I am just different. Different in the way I analyze and question assumptions." And a Prairie State education alumnus said that he, too, had become more "analytical" and "patient" over the course of his doctoral studies, attributing these changes to the diversity of perspectives and questions he had encountered in the program. "I used to jump on things," he reflected, "and get them done just to get them done. I think the program forced me to think and it forced me to slow down. . . . It taught me to plan better so that you are not just . . . reacting to peoples' crises. . . . To be more in a planning [and reflection] mode instead of a reactionary mode."

Relational Teaching and Learning

Relational teaching and learning was a common practice in the vast majority of doctoral programs we studied. In a nutshell, students in these programs interacted with each other more or less as colleagues, stretching -- and supporting -- each others' thinking and skills development in ways that substantially enriched their doctoral experience and positively affected their learning and development. In this context, we use "relational," from the Latin, "relatus," meaning to "carry back and forth," to refer both to the collegial mindset students had toward their peers as well as to the mutually enriching teaching and learning that occurred among them.

Faculty and administrators used two strategies to build a foundation for relational teaching and learning in their programs. To begin with, they stressed the importance of collegial dialogue and collaborative activity to students early in their doctoral studies. A Prairie State administrator remarked that in their orientation session with new school administration students, he and his faculty colleagues stressed to students the value of "teaming, collaborating, and working together" because "that's how

problems are solved today -- nobody goes into their own office, closes the door, and does it her or himself." A Major State engineering professor pointed out that he and his colleagues assigned every new student to a research group upon entry into their program, "encourag[ing] them to interact with each other" within a collegial "atmosphere in which there is considerable learning from one another. . . . [We] think that not only is helpful to them [as students] but in their professional careers engineers work in teams. Unlike scientists who may live fairly solitary lives, an engineer has to be able to work with a group of people – to be able to communicate ideas, have reasonable people skills, and work in groups." And an advanced student at Gotham State told us how faculty "set a tone" for relational teaching and learning in its nursing program:

> I think that the feeling I had, the cooperation among the students, I think began with our initial meeting. When my cohort first started the program, we met with [the graduate program director], and she stated, right there, "We want you to cooperate with each other, help each other. This is not a pyramid system. We want you all to finish, and we think that you'll do that in the best way by cooperating and helping each other." That set the tone, I think . . . it seemed to start with the doctoral program administration themselves and how they wanted the student body to function on a cultural basis. They set the guidelines that they thought were useful, and told us, and people just followed suit.

We learned that faculty and administrators also fostered relational teaching and learning through the use of various "structures" that, they hoped, would encourage frequent and supportive interaction among students. Two programs each in clinical psychology, education, and nursing, for example, admitted students as a "cohort" and strongly encouraged students to complete required courses as a unified class. These cohort groupings often provided students with a small group of peers with whom they could interact frequently and from whom they could draw regular emotional support. As a Prairie State faculty member said of their cohorts: "There is a lot of connectedness among the students because they have their cohort group. If you would go into the classroom, I think you would find the culture is very much one of interdependence, collaboration, working together in group activities, and problem solving together . . . For students, the message is more "Yes, we understand we are expected to work collaboratively."

Research groups were analogous to student cohorts in the engineering programs. Several faculty and administrators told us they intentionally created common office or laboratory spaces as a means to

foster a sense of shared camaraderie, interdependence, and collaboration among students. As a Major State engineering professor related, "We've managed to preserve a large room where students can come, hang out, learn from each other, and interact. In my group (10 faculty, 50-60 students) we definitely value the idea of having students get to know each other and learn from each other."

In addition to cohorts and research groups, faculty and administrators often used other structures to facilitate relational teaching and learning among students. A Prairie State education professor, for instance, designed a completely voluntary, student-facilitated, dissertation seminar that encouraged students to discuss their dissertation research freely with their peers and invite their feedback. While he regularly attended the seminar, this faculty member emphasized that he did not facilitate it; rather, he simply ensured that a structure was in place so that "every doctoral student could help everybody else": "It's steel sharpens steel. They submit their work to one another and, in a kindly and supportive way, they criticize the heck out of each other. . . . [The value of the seminar] is cooperate and graduate." A City-State University nursing professor likewise said that she encouraged students to form study groups and to "just hang out together" because

> In my own personal experience . . . I learned more at the Friday night pot-lucks than I did in my entire program. That was so valuable. . . . The opportunity to work through ideas, problem solve, and challenge each other. [I tell students] that is the critical thinking stuff that doesn't happen outside of the classroom with your family over dinner. The number one most important learning experience for students is student to student interaction.

The efforts faculty and administrators put into fostering relational teaching and learning often greatly enriched students' doctoral experiences. In many programs we visited, interviewees enthusiastically told us how students "pushed," "challenged," and "supported" one another as they sought to relate to and make meaning out of what they were learning, both alone and with one another. As we learned, students deeply valued – and enjoyed! – teaching and learning from one another, particularly when they encountered views and perspectives that differed from their own and further stretched their thinking. As a Major State engineering alumnus told us, "Your colleagues matter -- and they matter a lot. That's not to belittle your advisors . . . but you learn as much from your colleagues."

Although students in all four fields of study helped us to understand how relational teaching and

learning had "made a positive difference" in their doctoral experience, we especially benefitted from the perspectives of four second-year Gotham State nursing students on this point. Their comments reflect the value they placed on learning through dialogue within the context of a supportive peer group:

> [Student 1]: The student to student interaction, for me, was really a great experience. . . . We could talk about different ideas. There was a lot of openness, less competition than I had expected, and really good discussion about people's ideas, and helping to further those ideas, and what did they need. And we challenged each other in a way that was a good experience.
>
> [Student 2]: [Part of that challenge] was exposing your ideas. It wasn't a feeling like you're going to expose your ideas and the other students are standing there waiting to attack you. It was just a matter of a feeling of, "Uh oh, here I go" . . . . I felt that the student group as a whole has been very supportive, both inside and outside the classroom, about ideas and how if somebody else was struggling, other people would be supportive of that.
>
> [Student 3]: Just looking at our cohort, I just finished coursework, and there's a second cohort since I finished coursework, and I would say that in our group, it's very much the same, and a lot of it had to do with identifying with each other and we found, actually spending time together, sharing our ideas in a very non-threatening but vulnerable way, was very helpful. I view [that] experience as valuable . . . because it's the group that sometimes pushed the envelope on thinking, or who kind of backed you up and said, "Don't panic, don't be fearful of the challenge to your ideas that may come from the faculty level."
>
> [Student 4]: In some ways, the cohort is standing behind you, sometimes they're picking you up, sometimes they're, you know, cheering you on as you're taking off. There's a variety of roles, but I think that cohort experience is very, very positive.

A different group of students – this time at Prairie State – was equally positive about the rich teaching and learning experiences they had with their diverse, educational administration colleagues. "You get so many perspectives," a second-year student told us, "and it's also nice that you know that not everybody agrees with everything [that's said] . . . but you never feel like someone else is being disrespectful towards another person's perspective. I really appreciate that." "The fact that you're hearing so many different perspectives," added another student, "strengthens you as an administrator." A third student agreed, and then said appreciatively, "I think that when you are engaged with other people and talking about difficult ideas or when you are struggling with something with others -- I just think it adds a great deal to your learning."

As these interviewees' comments suggest, listening to, bouncing ideas off of, and learning from

smart, interesting, and collegial peers was a highlight of their doctoral experience. Regardless of whether it occurred in class, at the lab, or over a cup of coffee at a local diner, relational teaching and learning considerably enriched students' doctoral experiences, helping them to play with and understand ideas and techniques in their field in ways that often went well beyond what they thought possible. Perhaps this is why a Lakeview engineering alumnus did not hesitate to say of his peers, "They were very important. I interacted with them a lot. I'd say they were probably responsible for 40 percent of my learning."

What positive effects did relational teaching and learning have on students' learning and development? Perhaps not surprisingly, relational teaching and learning helped students to recognize the bounded nature of their own thinking, nurturing in them an appreciation for collaborative activity and the multiple point-of-view upon which it often depends. It also provided students with a fuller understanding of the nature of teamwork, improving their own group process, interpersonal, and leadership skills. And, finally, relational teaching and learning helped students to build and broaden a network of professional colleagues from whom they could continuously teach and learn.

Many interviewees told us that students became more aware of the benefits and value of collaborative activity when they questioned each other in a collegial discussion, worked together collaboratively to solve a problem, or stretched one anothers' thinking through a thoughtful critique. This appreciation developed, in part, as students listened to the diverse points-of-view and approaches their peers brought to the table, considered them in light of their own views, and became aware of limitations in their own professional understandings. As an advanced student in Major State's electrical and computer engineering program stressed, "Interaction is key . . . when you get seven individuals, everybody thinks a little bit differently . . . As a result, you just learn more and you realize that you have to talk to a bunch of people and get different perspectives, and you have to engulf yourself as much as possible and learn as much as you can, and see how things *really* are." A City-State nursing student likewise remarked: "The doctoral program has been growth-producing, supportive, challenging . . . Challenging to previous thought, challenging to previous attitudes, challenging to my previous opinions on things. When you listen to all these discussions and they're so diverse, you see different perspectives, and that's a change there [for me]. . . . You're challenged with, 'That's not the only way to look at this.'"

This student told us that she now understands why nurses need to collaborate with one another, patients, doctors, and others because, simply put, "we need that diversity in thinking."

Relational teaching and learning affected student learning in another way: the diverse contributions students made to one anothers' learning helped them to develop a richer understanding of the nature of teamwork, improving their own group process, interpersonal, and leadership skills. A dissertator in Major State's engineering program observed that his research group experience had made him more aware of how important it is for teams to build upon their collective assets: "The big thing . . . I've learned is that people all think in different ways, and there's not a 'smart' type of person and a 'dumb' type of person. Some things are good, some things are not. There are strengths and weaknesses. So I learned about people, just being out there." Along these same lines, two Frontier University advanced educational administration students discussed how their involvement in relational teaching and learning had strengthened their team leadership skills:

> [Student 1]: When I go back to my job, I utilize that knowledge formulated in groups. Look at all those strengths, all eight personalities can't be together. . . and now when we get groups together I know that you're the kind that really will insist and move forward, you're the organizer, you're the verbalizer, all these strengths come together. . . . I've organized a brand new school, by the way, and as I was choosing my staff I chose people with different strengths.
> [Student 2]: That's exactly what's happening now -- you're looking at teams. . . . And I think as an administrator she's looking at me at that point and saying, "This is where she'll be good, she's more of a hands on person." You have to work in teams.

Last, a number of interviewees emphasized the key role that relational teaching and learning played in providing students with important future "networks" of colleagues. A dissertator at Gotham State expressed this outcome when she noted how faculty expected students to become members of an ongoing scholarly community

> We got the same message, so it's a message that's been repeated all along, which is, "You're all in here together," and the other piece was, "Wouldn't it be great if, when you get done, you could call so-and-so at the other university and work together?" Like this is a lifelong relationship. It's a community of scholars and a lifelong relationship. It's not the four year undergrad thing where you don't see each other afterwards.

When asked if she felt like a member of such a community, this student remarked enthusiastically, "Oh, you bet. It's been great and fun." With much the same spirit, an alumnus of Mission University's clinical

psychology program said that the "collegiality" he shared with member of his class was "probably the highlight [of my doctoral experience]": "We just had a lot of fun together. . . . The relationships I developed there with my class are long lasting." Students and alumni in engineering and education programs offered similar appraisals, often ranking the ongoing relationships they had developed with their peers as one of the most important -- and enjoyable -- outcomes of their doctoral experience.

Mentoring

As we worked through the nearly 150 interviews in our data set, mentoring emerged -- perhaps not surprisingly -- as an important practice in almost every doctoral program we studied. Although intensity and commitment levels varied, we learned that the vast majority of faculty in these programs did not neatly separate teaching and research or self and subject into boxes; rather they vigorously sought to act on their shared passions for both, committing themselves as much to students and their development as to knowledge generation and scholarly inquiry in their fields. When this occurred, students and program graduates often spoke enthusiastically about their doctoral experience, underscoring mentoring as a practice that greatly enriched their learning and helped them to develop into self-confident and generative leaders for their fields.

Time and again, faculty and administrators emphasized that mentoring was an important practice in their programs. Many provided a clear and compelling rationale for its importance; more still illustrated how they enacted it with their students. An administrator in Major State's engineering program, for example, emphasized that he and his colleagues saw their students as "the future of the profession" and felt "a larger responsibility for these students and their development." Such a responsibility, he continued, carried with it the obligation of interacting with and supporting the growth and development of every student as a unique individual:

> I feel that we have to be interested in them as persons. We can't think of them mechanistically. We have to realize they are persons and we have to have a genuine interest in their problems and development. They are not cogs in a wheel, they are not employees or employers in an industrial sense. . . . They are all different persons. I have to approach their professional education in different ways for different people. Some require considerable guidance, some work best totally alone. The professor needs to nurture different talents and they must develop different approaches for different students.

Another administrator -- this time in Gotham State's nursing program -- offered a similar view, accentuating the important role good mentorship should play in enculturating students into a scholarly "community of practice" (Brown, Collins, DuGuid, 1989). From her perspective, when faculty served as scholarly mentors to students – usually as colleagues on research teams or collaborators on conference papers and journal articles – they helped students develop a "degree of intellectual discipline and [a] spirit of inquiry which made it possible" for them to develop into the next generation of leaders for the nursing profession. Mentoring in this context was particularly important, because it made students feel like they were "arriving and becoming part of the elite of the field": "There is nothing more powerful than the student feeling this . . . she becomes motivated to become a part of this group of researchers."

How did faculty members foster mentoring in their programs? As we learned, mentoring occurred in any number of contexts -- through scheduled and spontaneous one-on-one discussions with students about course work, the dissertation, or career paths; via individualized interactions in laboratory, clinical practica, and field research groups; and in meetings focused on the preparation of articles, grants, and conference papers. In all of these contexts, faculty shared their thinking processes with students through the posing of questions and the recounting of relevant past experiences and, in doing so, not only provided them with guidance and direction, but also scholarly models of thought and action.

To illustrate, an administrator in Cachet University's engineering program provided a flavor of the individualized guidance -- and modeling of scholarly practice -- he and his colleagues offered to students:

> There are times when we're [the faculty] there and we're working with them on a day to day basis. I know from my own part and other faculty because I get that sense from being there that there are times when you have students say, "All right, now here's the way we probably ought to approach this." I'll say to them, "Well come back in a week or two and show me what you got." These are the times when we leave them alone because that's their job. That's what they're supposed to do. We guide them, we mentor them, we teach them how to do these things and when they're done, we sit them down and say, "Go to it." It's an iterative process, not quite like undergraduate, you know there's the book, read the copy, you get it, and go on. There's a lot of trial and error. So after a two week period they'll come back and, if they're done, fine -- then you compliment them and go on. If they're not, then I try to find out what they did; I judge that by what they're showing me. Because there's two parts to it. There's the actual scientific content which may be good, bad, or different than what I expected. But there's also "What did they do to do that?" If they didn't get some progress on a solution, then I've got to find out,

> "Was the problem too hard? Were they not prepared? Did we not have give this idea enough time in testing it out? or Did we have a good idea and this person just didn't seem to know how to go about things?" You give them a little bit of mentoring on how to forge ahead when you don't know what you're doing. There's a whole bunch of issues like that.

A significant number of faculty also mentored students through the advising process, providing them with guidance and feedback intended to facilitate their learning and development as "scholar-researchers" and "scholar-practitioners" in their professions. A nursing professor at Brooks University, for instance, described the "full service mentoring" she provided:

> I like to laugh—my mentoring seems to be "full service mentoring." I talk to them about what they need in the academic sense, professionally, what organizations they need to go to. I invite them to come with me [to conferences]; if they're low on funds, they can share my room. . . . I need to show them how to network, who to network with, how to develop liaisons outside the university, because there's some very nice research activities that our students can link into . . . as consultants outside the university. . . . I [help them] look at professionalism, how to develop your career. I encourage students who I mentor to always have a five-year goal, and every year, we sit down and say, "Now what's the five-year goal?" With one student, I've been doing this for three years, and she said, "I'll never be goal-less." Well, that's the general idea. It's to keep you in a forward direction. I guess the informal mentoring -- teaching them how to look in an organization and identify the formal power and the informal power. . . . [The mentoring is] stewardship [for the profession].

The time and effort faculty devoted to mentoring was seldom lost on students and alumni. Many stressed how enriching it was for them to learn from knowledgeable professors who not only "stretched" and "pulled" their thinking, but who also had a sincere, generative interest in their development as scholarly professionals.

A City-State nursing student, for instance, fondly recalled an independent study she had completed with her mentor:

> We met every other week. I'd have to read a couple of articles and we'd discuss it. What I learned from her in [this independent study] was far greater than what I learned in my "Multivariant Analysis" class, because . . . she would help me understand [what I read better]. [She would say], "This is what I see here," and then she would expand that. And then when I would say, "Why didn't they do this?" she'd say, "Now that's a good question. Why didn't they do that? They should have."

From this student's perspective, her advisor took "mentoring seriously," going beyond "imparting knowledge" to "expanding" her "thinking": "It wasn't just, 'This is what you read, this is what I gained out of it.' [She] stimulated thinking. I've thought about things I never would have in a hundred years, or

tried to relate things to other things that I never, ever thought about. . . . She really pulled your thinking on things." This student also appreciated that her advisor – as well as other faculty members in her program -- shared their research with her, often "pointing out the steps in their thinking": "What they did, how they had these assumptions, and now they've changed this, or now they've looked back, or now they're trying to develop this." Hearing her professors' "thinking paths – the "nitty gritty of their thinking" was personally valuable to this student, stimulating her to think about her own -- and her professors' -- research in new, exciting, and unanticipated ways.

An alumna of Central State's educational administration program provided a similar account, sharing this anecdote with us:

> The faculty who really care about their students . . . [they] stretch and push students. . . . . All of the ones I know who I think are outstanding are overworked, have too many things going on, tend to be the one who get on every committee. I can think of one, Jane Smith . . . She really stretches you and pushes you, makes sure you go to the limit – that you just don't go through the motions. [In contrast], I can think of one teacher where pretty much you hand in the paper and that was good, whatever that was. Whereas with Jane, you would hand in a paper and she would tell you "This isn't as good as you can do . . . You need to do this and this and this to make this really be a quality piece of work.". . . And you would do it for Jane . . . because you know she would do it. She goes the extra mile for everybody and anybody. She doesn't ever back off and you know she would do it for you . .
>
> [That mentoring], I think, was key . . . because it gave credence to my learning. It made it… when someone would say to me "Let's go have lunch" and we'd talk about something we read or something in the course or whatever, it made it important. It validated that my learning was important. . . . When a faculty member shows you that your learning is important, it's not just to go through the motions, this is the syllabus, this is what's due on this day, and make sure you get there… but really what you're thinking about and how you're making sense of it and how you're incorporating it into what you already know, how it's changing your views. That piece is the most important.

Students and alumni not only valued learning from challenging, knowledgeable professors, but they also appreciated learning from faculty who had a genuine interest in their learning and development. Some were humbled by the respect and concern their professors had for them as learners, such as this engineering student at Cachet University: "They really seem to take a really strong interest in developing you as very capable people -- not only in engineering but in research and personally as well. I get a sense from my advisors and people in the program that anything that you want access to or have questions about

or want to pursue, whatever they can do to help you, they'll help you with -- on top of being some of the brightest people the modern world has been able to produce." Others were astonished that professors invested time in them over other competing priorities. "I am so surprised at how willing faculty are to spend time with us," remarked a Gotham State nursing student. "They mull over what is going on in our head and ask us what we think. I feel that my opinion is valued by [my mentor] and everyone else. . . . I really get the sense that faculty are really interested in our success. And it's not just so they can turn out successful students but because it is really important to [them that] nursing doesn't stagnate . . . . The goal is not to turn out students but to give back to nursing."

These positive accounts notwithstanding, we also interviewed a small handful of students who said that their doctoral experience had been marred by an absence of mentorship. These interviewees pointed out that while their advisors "pushed" them, they seldom provided students with the guidance and support needed to tackle challenges successfully. Consider, for example, the following critique made by a Major State engineering student of his advisor:

> I hardly ever see him. It is that bad. . . . He doesn't give me direction on where he thinks I should be going. Part of that is he is too strapped for time. But it is very frustrating. We are supposed to meet an hour a week but it is more an hour a month. . . . He hasn't taken the time with me. . . . Now he wants me to work on this paper but he hasn't told me very much detail or where he wants me to go. He just wants me to go at it. . . If someone could just help me through one [paper] I would be in so much better shape.

Not altogether surprisingly, students who experienced poor mentorship often felt that their advisors had little to no interest in them or their professional development.

Whether they offered negative or positive accounts, stakeholders across cases indicated that mentoring, as a practice, considerably enriched the doctoral experience -- often for both students and faculty. In light of this, what positive effects did mentoring have on students' learning and development? What "difference" did the practice really make in terms of student learning?

In carefully reviewing our interview material, we came to understand that mentoring had two interrelated, salutary effects on students' growth and development. First, mentoring often strengthened students' confidence in themselves as learners. Second, the validation students received from their mentors not only enhanced their confidence, but it also helped them to see themselves as intelligent,

skilled leaders for their professions.

In almost every program we visited, interviewees emphasized that mentoring substantially enhanced students' confidence in themselves as learners and professionals. As we learned, when faculty spent time with students thinking through and solving problems, puzzling through questions, or simply batting around ideas, their actions left a marked impression on students, validating for them in a very real way that their learning and development was "worth" their advisors' time. Additionally, since students were often "stretched" by their mentors in these one-on-one meetings, the experience of slowly "mastering" a learning curve that had been laid out and supported by their mentors greatly enhanced their confidence as intelligent persons who "could do this kind of stuff." An alumna of Central-State's education program expressed this outcome as well as anyone we interviewed, saying of her mentor:

> She was wonderful. She literally pulled me sometimes, other times she pushed, and other times she said, "You're on your own because you can do it and I don't need to step in for you here or whatever." . . . [That] opportunity to engage . . . was very empowering. It made me feel like a learner, like a scholar, and I guess it gave me that belief that I could do it. It was something within my means. Which really is very empowering.
>
> [Interviewer]: That you could do what?
>
> Think. I could be a scholar. I could be scholarly. I could read something and maybe find something that someone else hadn't. Or even be affirmed that how I interpreted it was in fact how someone else interpreted it who I had high regard for, like [my mentor].
>
> [Interviewer]: Talk to me a little more about this idea of beginning to understand yourself as a scholar . . .
>
> It's been an evolutionary kind of thing. I always knew I was bright, I did o.k. in school, that kind of thing, but I only did just the surface, I never was an in-depth thinker. And having the time and having people to talk to and reflect with ... just over time it became more important to me to not just look at it from the surface but to really get into it deeper and try to find what other meaning was there. I think being in the place I was, having as much time as I had, and having people who were really supportive and who would reinforce it all the time [made a big difference]. . . . That whole thing of finding one's voice – my [dissertation] committee kept telling me that the whole time, "We're not hearing your voice." It took me a long time to get to the point where I was confident enough to share my voice. But I think that happened because there were a lot of people around all the time encouraging me, telling me, "You do have something to say, you're worthwhile, and you do know how to do it, you know how to say it."

With similar zest, an alumnus of Mission's clinical psychology program said that he was "amazed" by how much his advisor "believed in him" -- a belief that, in many ways, validated him as a

knower, learner, and professional. As he put it: "There were a couple of conversations between [my mentor] and myself where I had the experience that she believed in me and, then, when she said, 'Congratulations, Dr. [Smith]' when I passed the dissertation [that was really memorable]. I really had a sense of feeling believed in. . . . That gave me confidence in my own ability to do this type of work . . . So one [key outcome] would be the confidence."

Faculty also recognized the confidence that developed in the students they mentored. An administrator at Prestige State, for instance, said that by "pushing" her students to "do things they didn't think they could do" -- always "telling them that you know that they can do it" -- her mentoring had helped students become more confident in their own intellectual and professional abilities. "I worked with a man to help him learn how to do some statistical analyses that initially he was in tears about because he just felt so incompetent," she related, "and now he's a full professor. Or making [Jane – another student] give a talk or teach a class even though she thought she was going to faint. . . . There is nothing like that kind of mastery – there is no substitute for it. You just provide the encouragement and the message that they can do it and they need to do it."

We learned that mentoring had another positive effect on students: it helped them to define themselves as bright, capable leaders for their professions. This outcome was closely tied to the first: as students were encouraged by their advisors to learn and grow in ways they had not thought possible, they gained confidence in their abilities, validating themselves as intelligent individuals who could "make a difference" in their fields. We spoke with an advanced student in Gotham State's nursing program, for instance, who told us that she had "just spent the past year" working closely with her mentor on a grant that had allowed her to "meet and work with some of the major researchers in the field." This experience had helped this student to rethink her abilities and reconsider her potential contributions as a leader in the field:

> I used to believe that anybody with a Ph.D. had some qualities or characteristics that others couldn't have. They were in a league of their own. In one sense it has been disappointing to realize that they are normal people but in another sense it is exciting to know that I can be one of them. That I can have an impact on the profession. Before I came I saw myself as part of the totem pole maybe on the bottom, but I don't categorize people like that anymore. We all have something to offer. I feel more confident. Now I

believe I can contribute something.

We heard many stories like this throughout our study -- from students, alumni, faculty, administrators and, even occasionally, employers. In the vast majority, interviewees emphasized that working closely with an experienced guide who stretched students -- but who was mindful to provide them with support throughout -- greatly benefitted students, often helping them to develop into self-confident learners capable of generative leadership within their professional "communities of practice."

Integrative Inquiry

In culling through our interview material, we identified integrative inquiry as yet another practice that noticeably enriched students' doctoral experiences and had positive effects on their learning and development. In many programs in our study, interviewees indicated that faculty embraced and taught an "integrated" view of knowledge and practice to students, stressing the connected and dynamic interplay that occurred among theory, research, and practice in their fields. In this context, "integrative" is drawn from the Latin, "integrare," meaning "to make complete or whole," and inquiry refers to the act of seeking understanding. When faculty emphasized this practice, students often forged connections among theory, research, and practice that they had not previously, developing a broad and integrative perspective on inquiry that substantially changed the way they approached their professional practice.

Faculty and administrators fostered integrative inquiry in their programs in two ways. First, they communicated to students their common belief that "real leadership" in their professions depended upon individuals who understood -- and valued -- the interconnectedness of theory, research, and practice. One barometer of this belief found expression in the hyphenated phrases faculty and administrators used to describe the purposes of their doctoral programs: in clinical psychology, the emphasis was on educating "scientist-practitioners," in nursing, preparing "nurse-researchers," and in educational administration, developing educational leaders who understood – and practiced -- "data-based decision-making." A Prestige State administrator, for instance, told us that he and his colleagues firmly believed that "to be an excellent researcher in clinical psychology, [an individual had] to be extremely well-trained in clinical practice, too . . . you have to have both." He provided an example of how he and his colleagues explained this "blended" emphasis on theory and practice to students and others:

> [We tell them that] if you want to do studies that research the etiology of disease, then you really have to understand the disease, and a neuroscientist or a cognitive psychologist wouldn't have that training. They wouldn't know how to diagnose them or treat them, or how to handle them. You would have access to them. So to do research on the causes of mental illness, you have to be an expert in the mental illness. To do genetic studies in mental illness, you have to be able to accurately describe the phenotype. . . . We think that the clinical training is extremely important, but we want to be sure that that training serves in research. Plenty of degree programs just train therapists, ours trains people to go out and do . . . both.

Along these same lines, a Brooks administrator indicated that their doctoral program in nursing "emphasized knowledge development through theory generation," but that she and her colleagues only "approved dissertation questions" that had "direct implications for the practice of nursing." This view was confirmed by another administrator in the school of nursing who, in an exasperated tone, said "I just want to scream when I see other doctoral programs out there and how they don't emphasize research to enhance patient care . . . Here we start from the view of the public – that every bit of new knowledge is a benefit to the public." The integration of theory, research, and practice to enhance the professional knowledge of nursing in ways that would, ultimately, lead to better patient care was certainly the mindset that animated faculty and administrative practice in this program.

Besides communicating the interrelatedness of scientific and practical knowledge to students (and other external audiences, for that matter), faculty and administrators fostered integrative inquiry in their programs in a second way: several provided students with simulated and "real world" learning opportunities in which they could apply, reflect upon, and reconsider intersections among field-related theories, research, and practices. Some faculty did this through application-oriented pedagogies and projects in their courses, including case studies, simulations, role plays, field-based research projects, and "applied" course projects that integrated theory with practice, while others (particularly in the engineering programs) invited "practitioners" as guest speakers to doctoral colloquia or seminars. At Mission University, for instance, we learned that several faculty required students to complete field-based research projects in their courses. From the perspective of one administrator we interviewed, projects of this sort helped students to see the limitations and benefits of theory, as well as to understand how practice could – and should – inform the development of empirically-grounded theory. "One thing they find," he

explained, "is that the theories were not developed in the context in which they find themselves today as a practitioner":

> So they have to reconcile many of these theories [with the realities of current clinical practice]. For example, the assumption a lot of theories have on family structure, family functioning, history of families [are outmoded]. We have a large immigrant population with very few family theories dealing with acculturation or cultural stress. So they have to figure out what they have learned about the acculturation process and integrate that into what they're thinking about treatment because it hasn't been done as far as theory.

That latter step, he remarked, often provided students with their first real understanding of how practice -- and the limitations of current theory -- can lead to the forming of research questions and the generation of new knowledge.

Particularly in the education programs, faculty and administrators provided numerous examples of how they used case studies, simulations, and role plays to promote integrative inquiry among students. A professor at Prairie State University discussed how one of his colleagues helped students to draw connections among theories of organizational communication and conflict resolution, interest-based politics, and various nitty-gritty negotiation strategies through a simulated teacher union-school board contract negotiations meeting. "The students," he remarked, "all have roles and they come prepared to go all night -- which they usually do." Similarly, at Central-State University, a program administrator told us that she and her colleagues frequently used case studies, role plays, guest speakers, and field-based research and/or applied projects to challenge students to "think differently about the world in which they're working." From her vantage point, once students were challenged to step outside of their classrooms or schools and really see "how decisions get made -- and seldom on the basis of what the research says," they began to think more holistically about the interconnections among theory, research, and practice, and how they, as educational leaders, needed to think about issues within this broader, more integrative framework.

Time and again students and alumni told us that they had particularly enriching learning experiences when faculty encouraged them to bring theory and research to bear on practice – and vice versa. And while they did not specifically use our term "integrative inquiry," students shared many stories that accentuated how much they valued drawing upon and "connecting" together the tools and

concepts of scientific inquiry and professional practice to frame, understand, and solve complex problems in their fields.

To illustrate, a student in Central State's educational administration program enthusiastically recalled an experience in which she had been challenged to "work the interface" between theory, research, and practice:

> One of the courses we were in was the superintendency course. We could have done a lot of different things in a course like that because the role of the superintendent [is so multi-faceted]. "Superintendent and Central Staff" is the name of the course. It very much could be a dry textbook kind of thing where you go to class, listen, do the paper kind of thing. But instead the instructor had us take on a topic and each of us take on the role of different people in the school -- one person was the superintendent, one person was a principal, one person was an assistant superintendent for personnel, those kind of roles. Our topic was charter schools. So we went into all the different things you would have to take into consideration and as if you were that person in that role. Spreadsheets as far as the budget is concerned, a PowerPoint presentation that we put together that was all of us together. We then presented it in front of the other students in the class -- they took on the role of Board Members. Now, did that take some time? Yes. Was it challenging? Yes. Did we probably spend more time on that than if we had we just been told to read the book and answer the questions and write a paper or something? Yes. Did we get something out of it? Yes. . . .

When asked to elaborate on what she found so "challenging" about the assignment, this seasoned administrator discussed how it had stretched her to integrate the methods and concepts of scholarly inquiry into her practice-heavy "tool belt," helping her to frame and make better sense of a practical, real world problem:

> We filled the tool belt even fuller than it already was because we had to look at things from a different perspective. As we were looking through the issues on the charter school and looking through the research behind it, we were [also] looking at what everybody brought to the table on that topic. We were also looking at what [pieces] of that [literature] would we bring back and use in our own school. What components of that could we use and how would this help our own school improvement process? Are there items that we could pull from that and put in place without it being a charter school or anything else? What are the good things that we may want to infuse in the program the way it is?

Representing a view expressed by many engineering students in this study, a second-year Major State student said that some of his "best learning experiences" occurred when his professors assigned homework that required him to bridge the theory/practice gap in the laboratory. "That seemed more real to me than class," he explained, because "I got to see how things work. The theory you learn in class, but

once you have done the experiments and you see how complicated they are, it is nice to have the language to describe it." This student greatly appreciated being challenged to integrate the "scientific knowledge" he was learning in his classes with the practical realities of "real world" engineering problems in the laboratory. As he put it, that "application helps you get to those points more quickly and actually have an understanding of what happened" -- an "understanding," he intimated, that wove theoretical and practical knowledge together in a highly meaningful way.

Several employers also told us that they valued faculty who accentuated integrative inquiry in their courses. Such a practice, they explained, often helped students to develop a deep appreciation for the interconnectedness of theoretical and practical knowledge within the messy world of professional practice. As an employer of Major State's engineering graduates put it:

> You've got to have both, because you really can't do one without the other. There are some [doctorally-prepared] people who have avoided the realization part of their learning who come here and end up being weaker. . . . There are other folks who come from schools who have a relatively weaker academic and theoretical background, so they're great at building, but it's hard for them to understand what it takes to move to the next level of technology or, if something fails, what was the root cause of the failure. The foundations are missing. So you have to do it kind of in parallel. I guess what I was saying is that [Major State] trains their technical people, kind of on parallel paths that way – it's an equal emphasis.

We came to understand that integrative inquiry contributed favorably to students' learning and development in at least one major way: because it prompted them to think about field-related knowledge and practice in more "connected" ways, many began to approach issues and problems in their professions from a more informed, holistic, and scholarly standpoint.

Two students in Gotham State's nursing program richly illustrated how their understandings of – and approach – to professional practice had shifted over the duration of their doctoral studies. They attributed this "shift in thinking" largely to the shared emphases program faculty placed on (1) the inseparability of theory and practice and (2) the importance of "research-based practice" in the field of nursing. Before pursuing their doctorates, for example, both said they saw "research and theory" and "clinical practice" as largely dichotomous activities. Now, however, they saw "things very differently." As one explained:

> [Student 1]: I used to see, when I was in the masters program and before that, that there was a huge gap between practice and research. I guess I can see, yeah, there can be that gap, but research should be done with the benefit of clinical practice, and there really shouldn't be that gap. I guess you could theoretically be a researcher who did research that didn't do much to benefit practice, but I think what happens is that it might benefit practice more directly or less directly, depending on how proximal or distal it was to the practice. I think I see now that there really is less of a gap. I didn't understand that when I was a master's student. I didn't understand. All I saw was these Ph.D. types who sat at their computers and came and taught classes and didn't really know what was going on in the real world. There might be people like that; I don't think that there aren't, but I see less of a gap today, and I see that there can be less of a gap. . . . [We need to be] the bridges.

This understanding that they -- as nurse-researchers -- should be "bridges" who used theory and research to inform practice and practice to inform research and theory, substantially reoriented the way these women thought about and enacted their professional roles. As the other student related:

> [Student 2]: My opinion now about "reality" in a clinical setting versus "reality" in the research setting [has changed] – the more I learn, the more I realize what we don't know. And I've come away with this idea that, in the practice setting, I hate to say it, but it's like institutionalized quackery. Because so much of what we do, from my own personal experience, healthwise, my family's experience healthwise, is we have so little answers, good answers for people. There are a few things that we do o.k., I think. If somebody's in an automobile accident, they can sew someone up, but if somebody has a very serious illness, cancer, all kinds of immune problems, we just don't have good answers. And so, to me, this idea that the real life is in the clinical is just, I mean, I think people there are just operating and using practices and principles that may have little basis.

A different student – this time at Central State – offered a slightly different perspective. She credited the program's integrative emphasis on theory, research, and practice with helping her to move away from a largely "intuitive," subjective understanding of professional practice to one that now stressed scholarly, "research-based" practice and decision-making. "[Before I entered the doctoral program], I think I oftentimes had this feeling that it was right, a feeling that it was the right thing to do. Maybe I had gotten into it and read some literature on it. But I think the opportunity in the doctoral program to really get in and look at data-driven decisions and what it means and research-based decisions -- I think I have used that so much more now. . . . Now not only do I feel that it's the right thing to do but I feel supported in that from the research and the data."

While several faculty members across all disciplines observed similar changes in students from

largely "intuitive" to more "scholarly-based" approaches to professional practice, an administrator at City-State University may have best described this "shift" when she remarked:

> Doctoral education does not really give you more new knowledge but rather it helps you think differently. New knowledge we can get through a book. Ph.D. programs make you think about your world differently.
>
> [Interviewer]: What does that mean?
>
> I think it's that understanding that there is a way to think about your practice. Because if theory building doesn't relate to the practice of nursing -- and there may be 20 links to get it there -- ultimately there has to be a link to what we do as a practice and a discipline. The appreciation that there is science-based practice. Understanding the theory behind what you are doing. . . . Truly understanding that value of science and theory is one of the things that happens. It is one of the cognitive changes that occurs.

Indeed, an alumnus of Frontier's education program -- which placed a strong emphasis on case studies, simulations, and field-based research projects in its curriculum -- offered compelling evidence that he had experienced a "cognitive shift" during his doctoral studies. His story is worth including here not only because it nicely illustrates this outcome, but also because it sends a strong message about the benefits that this "shift" can have for leadership within the professions:

> What it [the doctoral program] did exceptionally well was tie my job to what is happening. Now, when I look at research, I've listened to people talk about it and think, "Oh yeah, what does that have to do with me?" I can look at research and say it has a lot to do with what I'm doing, because I can look at research and know that someone has been out there and they've actually done this, and I can say, "Well, I can take this and apply it to my school to help improve my school." So data that's collected and interpretation of that and actually applying it to real life situations, that is one of things that [happened to me in the doctoral program that] is very positive for me.
>
> . . . .If I'm going to be an educational leader in my school, I need to be able to access information. . . . We don't have a lot of people [in educational administration] going for their doctorates compared to the number of people who are there. I think that [educational leaders need to] be able to look at data and interpret that data to help them perform their duties on a daily basis. I believe that this program does that [for its students]. . . . *If I'm an educational leader, then I need to be able to lead, and I can't lead if I really don't know* [interviewee's italics]. I think that any doctoral program should be helping students to . . . tie research to what they are doing on a daily basis.

Authentic Discovery

Engaging students in authentic discovery was the last practice we identified that "made a positive difference" for students in our study. In every program we visited, faculty and administrators emphasized

some form of independent, hands-on, research-based activity -- such as an applied, field-based action research project or a traditional, scholarly dissertation -- that challenged students to discover and generate new understandings of knowledge and practice in their fields. In this context, "authentic" refers to genuine student engagement in the "ordinary activities" of a scholarly culture (Brown, Collins, and DuGuid, 1989), and "discovery" stresses the process of forming new understandings through rigorous search or study. As we came to understand, authentic discovery – as a practice – consistently enriched students' doctoral experiences, strengthening their development as independent, highly-skilled contributors to their professions.

Faculty and administrators provided us with varied examples of how they fostered authentic discovery in their programs. Some, for instance, elaborated on how they helped students learn how "to discover knowledge" through the mentoring process, while others emphasized the pivotal role that the dissertation (or, in one case, an applied research project) played in helping students learn how to conduct independent research in their fields. Regardless of the approach they used, faculty and administrators told us that they stressed authentic student engagement in research-based activities for one reason: most believed strongly that students had to "learn how to learn" if they were going to be effective leaders for their professions, and that the best way to teach students this was through actual, hands-on engagement in the knowledge discovery and generation process.

An administrator in Cachet University's engineering program elaborated on this reasoning perhaps better than any other stakeholder we interviewed. Grounding his remarks in his belief that "real leadership" rested on a professional's capacity to "learn how to learn," this administrator said that he and his colleagues placed a premium on helping students learn how to "approach" and puzzle through "ambiguous, open-ended problems where you have no idea if you are even asking the right question, much less whether you're taking the right track. How do you chart yourself on that and keep yourself from going down a black hole?" From this administrator's perspective, engagement in research-based activity was the "best way" to help students develop into independent learners capable of "knowing how to learn and how to discover knowledge":

> To be able to delve into something new if they have to on their own -- that [requires different skills] than getting that prior content through courses or individual reading with faculty. They're not going to have a faculty member or mentor later on; they're going to be out there and expected to do that on their own. That's what they learn to do in their thesis, that's what they do in [conducting] research. They discover new knowledge. They go out and do stuff that nobody knew how to do before, nobody knew about, or even thought about before. . . . They take a chance that if it doesn't look like it's supposed to work but maybe it will if they change it in a little way -- that's getting in there and getting your hands dirty and seeing what's really going on.

Engineering faculty and administrators were not alone in emphasizing the importance of hands-on research activity and the role it played in teaching students "how to learn how to learn." A nursing administrator at Brooks University told us that she and her colleagues worried about "the knowledge explosion and the rapidity of change and acquisition of knowledge" in the health care field and what it meant for leadership in their profession. "Maybe," she paused, "the best thing we can do [in light of this] is teach them the resources they are going to need to have [to keep on learning]. . . . I think we can teach them that [how to learn] through research. . . . It goes back to taking lots of knowledge and synthesizing it. I think we have to teach that." Similarly, a professor in Mission's clinical psychology program said:

> I think that in this day and age, we're trying to figure out how to help people think about things, understand things, and learn how to seek the information -- I mean that's really where it's at because the volume of information is just crazy -- it's just too much. So I think . . . that until they start applying that knowledge base, I think that it doesn't mean a helluva lot. I think it's true for graduate students. I think until you're out there getting your hands dirty and conducting a research study and really being responsible for it . . . that's when you really learn [how to learn].

When we asked faculty and administrators to "unpack" what they meant by "learning how to learn" and how the research process contributed to this, their responses almost always centered on two key ideas. First, most said that the research process provided students with a systematic approach for discovering and generating knowledge. Once learned (which often occurred through the dissertation process), this approach consistently informed students' future problem-solving efforts. As an administrator in Prairie State's education program put it, "I think the process of problem formation, of finding out what has been done in related areas, of being sure that the problem has not been solved, of convincing the advisor that it is a fundamental problem worthy of serious study – all have valuable components. . . . I think [learning the research process] carries over into one's life and personality. It tends to [make students' thinking] systematic."

Second, several faculty and administrators stressed the role that failure and unanticipated setbacks in the research process played in teaching students "how to learn how to learn." A Major State engineering professor, for instance, said that grappling with and working through failure helped students to understand that it was "possible to get around roadblocks": "To see that when you run into your 99th road block, that you've been through this before and you'll find a way. If you don't find a way, then you change the problem a bit or shift. I think there is a big middle part of the thesis where students are learning how to get around road blocks, take risks, spend time on things that might not work out, and have faith that something will come out of it." Being persistent, trying a different approach, rethinking an assumption, rechecking code, or returning to the literature – faculty and administrators repeatedly stressed that failure helped students to learn these and other strategies, further enhancing their capabilities as independent, resourceful, problem-solvers/learners.

The emphasis faculty and administrators placed on authentic discovery often greatly enriched students' doctoral experiences. In every program we visited, students and alumni told us that they had benefitted considerably from their engagement in research-based activities, with many singling out the dissertation as their most valuable doctoral learning experience.

Students and alumni generally valued authentic discovery for two reasons. First, many said that engaging in research-based activity challenged them to apply and understand what they already knew in deeper, more meaningful ways. As an advanced student in Cachet University's engineering program told us:

> I only learn something when I use it. If I don't use it, it's long gone. Doing the actual research, I have found that when I am working on some point of my thesis work, I realize that I will have learned something so much more deeply something than when I was exposed to in class. [Back then] I glossed over but now I really understand it. Why? One, because I use it. Two, because I've delved much more deeply into that area.

An alumna of Gotham State's nursing program offered a similar account. As she explained, although she had learned how to do research through her classes, "doing research" and "thinking like a researcher" did not become real until she was in the throes of her doctoral dissertation. "The real learning was in the application," she related. "It was in the application of the material in terms of the writing, the

analysis . . . going out and collecting the data myself. . . . That was beneficial, and that's where I really learned [how to do research]."

Students and alumni also indicated that they valued authentic discovery for another reason: it challenged them to learn how to think and "figure things out" for themselves. While students and alumni often spoke appreciatively of the guidance faculty and others provided to them as they worked their way through various research projects, many also underscored how beneficial it had been for them to work independently, puzzling through conundrums, making sense of raw data and unanticipated results, and communicating their conclusions to others through coherent, logical prose. This benefit was noted frequently in conversations about the dissertation, perhaps because students assumed a major amount of the responsibility for their research from start to finish.

An alumna of City-State's nursing program especially valued the independent learning she had experienced through her dissertation. In her words:

> The dissertation process itself was extremely rich, because I felt very competent to be able to do it myself after I got done. . . . So for me to be able to put into practice what I know, which is what the dissertation made me do, was extremely growth producing, and I think it made for very effective learning. It forced me to be an independent learner. I had to get the things I needed, I had to figure out how to find the resources, I had to figure out how to get questions answered. When individuals have support around them to do that, or are forced into having to do it on their own, that's good learning.

Another nursing student – also at City-State – likewise emphasized that she learned much "figuring things out" on her own, giving voice to her experience through this anecdote:

> I am mostly someone who stumbles around in the library. . . . I get a sense of where things are and how I can use them by mucking around. . . . After I finished my comps and wrote my proposal, I didn't have a clue what my dissertation was supposed to look like . . . I think my best learning experience was when the most intimidating professor said to me [at my orals], "So what you're saying, if I hear you correctly, is that you are just going to walk into the library and just figure this out by yourself?" They were all sitting there bobbing their heads like those dolls in the cars. I was thinking, "Why did I pick these people?" Because I don't have a plan, I don't have a literary approach, I don't have a clue. They signed off on me; they said they had faith in my ability to figure it out. I finally went to my minor professor in English and admitted I was clueless . . . He said that when he has students who are having trouble getting focused he directs them back to a novel or short story that they have read that has been particularly meaningful to them -- and to get some ideas from that. Well there was no question about the novel. So I reread it and started to problem solve and wrote things out and I finally got to my subjects. It took me a year to do that and it was excruciating . . . My study doesn't look anything like

> my original proposal. Now I have a research question and a theoretical framework. I came across it by accident -- in the stacks. . . . The best learning experience for me has been having to figure things out on my own.

Authentic discovery -- as a practice -- had three important effects on students' growth and development. First, as students assumed responsibility for their dissertation or other-research related projects, they often matured into more confident, independent professionals who now recognized that they "knew how to learn." Second, engaging in genuine, research-based activity consistently strengthened students' commitments to their professions, leading many to feel more "accountable" to share their wealth of knowledge with others. Third, and perhaps most obvious, conducting and writing up a research-based project or dissertation improved students' communication, organizational, and research skills.

Many stakeholders told us that as students entered into and completed various research projects -- and, most especially, their doctoral dissertations -- they quickly matured into tenacious, independent, research-minded professionals who were confident in their abilities to continue to learn and contribute to their fields. A Lakeview engineering student nearing the completion of his doctoral dissertation, for example, remarked that he now felt confident that he "could work anything": "I know now that if I am interested in something I can teach myself or I know where to go to find what I want to know. I don't need to take a course in it. In this industry you see a lot of short courses. I think they are a waste of money. Give me a good book and that will be good enough. I have developed the confidence to learn independently." A City-State alumna expressed a similar point of view. As she observed, her doctoral program had taught her how to read, interpret, and conduct empirical research, nurturing her confidence as an independent researcher-practitioner:

> I expected my doctoral program to teach me what I needed to know about research methods so that I could use them in my clinical practice -- so that I wouldn't have to necessarily rely on people to give me advice. And if I was relying on people to give me advice, I had some of my own background to compare it to, to learn how to find other ways of looking at that to see if I agreed or disagreed, and I could formulate an informed opinion. I now have an informed opinion about research. I know I don't know everything there is to know, but I know how to go about finding other people that I would respect, who could offer me their opinion, so I don't just take one person's advice.

Finally, an advanced engineering student – this time at Cachet University – captured the sentiments of

many students and alumni we interviewed when she said of her research-related learning experiences:

> I have always gone with the theory that "we are learning how to learn, and that will last us forever."... When we think back on what we started with and what we are ending with it is really incredible. I think we all know that we won't be doing the exact same thing when we leave here. So I think it is pretty well accepted that you are picking up the tools that will help you keep picking up the tools. I think anybody who gets involved in a graduate program knows how to learn, so maybe it's the realization that we know how to learn.... It is us showing ourselves that we can continue to pick up new things.

Faculty and administrators in programs across our study reiterated these student accounts. A professor in Gotham State's nursing program, for instance, said that most of their students developed into confident, independent researchers as a result of their engagement in various research-related activities:

> The confidence level I think is the most obvious change because they are no longer floundering. They know what steps to take to embark on their research career, because they have gone through a couple of those experiences.... Being able to have that degree of know-how is giving them a degree of "I don't care what anybody says. I know what I am doing. I don't need anybody's help and if I do I know where to go." They are pretty clear on how they address their scholarly questions and how to access resources. To me that is pretty critical in the transformations that you see in the students.

A Mission University psychology faculty member could not have agreed more. From his perspective, the research and clinical experiences students completed helped them to acquire a "certain professional package" of skills and attitudes-of-mind, including "self confidence . . . the capacity to be independent thinkers, and greater comfort with research." He especially observed that when students were "thrown into situations" that were "ambiguous and under-supported," they were far more likely to "figure out ways to make it seem manageable": "This requires students to find the information they need to be successful and they learn to put things together in new ways to meet new circumstances. So they learn how to control adversity."

The confidence students developed in their research abilities specifically, and in their abilities to learn in even the most ill-defined situations generally, may have contributed in part to the second outcome of authentic discovery: a stronger commitment among students to lead and share their knowledge with others in their professions. Armed with a richer understanding of the research process, as well as a considerably larger body of knowledge, a dissertator at Frontier University quipped that he "no longer saw problems" in life anymore, just "things getting in the way or obstacles that I'm going to do something

about." This student's newly-found confidence in his abilities to solve even the murkiest problems may have contributed to his commitment to share his new learning with others:

> With all of the knowledge that we've come across because we've been required to read an awful lot in this program -- even until today, there's so much in our minds that we now have expanded to -- how could you not do something with it? We know too much, we're too aware now to just continue the way we did three years ago. . . I know, personally, that I'm much more confident, I know where I'm going. . . . I want to make a difference and an impact in this field and now I know I can do that.

Similarly, a graduate of Gotham State's nursing program told us that her confidence in and knowledge of the research process had "prepared" her "to be a more effective leader in nursing": "I stand up for what I believe in. I know that research is important in order to improve the health and well-being of clients."

Once again, a number of faculty and administrators echoed these student and alumni accounts. An administrator at Lakeview University said that student engagement in authentic, research-based discovery not only helped students to develop a "patience coupled with a tenacity to get through a problem," but it also "adds the confidence, the knowledge that they can solve the problems and have the tools to do that. It brings them into a community of their peers and provides them with the understanding that they are part of that community and now owe something to that community." A Brooks University administrator similarly remarked that many of their nursing students, usually as a result of their dissertation experiences, had redefined their identities, seeing themselves as "members in a very select group." Many, she related, now viewed themselves as "advocates for nursing and spokespersons for nursing": "There is a sense of accountability [among them as doctorally-prepared nurses]. They are now responsible for the profession . . . and for the continued development of nursing."

Finally, many interviewees told us that students' research, organizational, and communication skills substantially improved as they participated in various research-based activities, including the preparation of journal articles, conference presentations, and their doctoral dissertations. An alumnus of Major State's engineering program -- whose assessment reflected those of many we interviewed -- offered this perspective on how his communication skills had improved over the course of his doctoral program:

When I started grad school I was very intimidated by writing and that was why I was in

> engineering as opposed to another field. I was intimidated by writing. I didn't like doing it. . . . I just never had to go through the process of constructing papers and paragraphs and go through the exposition of presenting. It is so painful. It is frightening staring at a blank piece of paper. It is intimidating. But now it doesn't intimidate me. . . .
>
> In the course of writing a Ph.D. thesis and conference papers and journal articles, I became very confident about my writing skills. I think they are very good and that they are something that I never would have developed had I not done the Ph.D. Also I had to do presentations – again that was something I was extremely intimidated by doing. I remember my first conference paper I presented in San Diego and I saw the rooms you present in the night before – the room was like a ballroom sized room – I mean it could seat 200-300 people easily. So the night before I presented I don't think I slept at all – my stomach was turning all night long. I maybe slept an hour. It was an awful experience. Now I can present easily and almost extemporaneously. I feel very confident now that I can go into almost any area and learn what I need to learn, write about it, and present it. Those things are valuable to me.

In addition to strengthening their oral and written communication skills, numerous stakeholders emphasized that the dissertation, in particular, strengthened students' organizational and research skills. At Mission University, a student in the clinical psychology program remarked that his involvement in various research-related activities not only helped him "learn how to negotiate, compromise, and communicate" his "ideas," but they also strengthened his organizational skills and helped him to "become extremely resourceful": "I don't know where that came from. I didn't have a class on how to be resourceful but I have become extremely resourceful both personally and professionally in terms of finding services. I can find the information I need for clients or for personal use or research information for my dissertation -- you 'know so-and-so did a survey, why don't I just call him or this person has written so much in this area, I want to talk to him.'" Last, and not unlike most students and alumni we interviewed, an alumna of City-State's nursing program told us that her research skills had improved considerably over the duration of her doctoral experience. "I learned how to take a theory and operationalize variables, how to design a study to measure what I wanted to measure . . . I was doing the best I could as a clinical nurse specialist, [but] I wanted to do the research piece." From her perspective, the doctoral program – and, especially, the dissertation experience – gave her "that piece."

Discussion

When taken together, the five teaching and learning practices we identified in our study form a

learning environment -- or culture -- that appears to value collegial and reciprocal engagement among faculty and students in a "community of practice" (Brown, Collins, Duguid, 1989). To be sure, not every doctoral program in our sample included all five practices, but the vast majority emphasized at least three or more of them. These practices -- individually and, especially, in combination -- nurtured a "holding environment" (Kegan, 1994) in these doctoral programs that pushed and stretched students in ways that they often did not anticipate, but nonetheless greatly valued. As such, these practices substantially enriched the doctoral experience for students, simultaneously supporting and challenging them to learn and grow as contributing members of their professions.

How do our findings relate to past empirical investigations on cultural, instructional, and curricular practices in -- and outcomes associated with -- doctoral education, as well as to more recent writings and empirical work on how individuals learn? We found broad, general support for the practices of relational teaching and learning, mentoring, and authentic discovery, and less support for the practices of problematization of professional knowledge and integrative inquiry, in the doctoral education literature. Additionally, recent work in constructivist learning theory also supports many of our findings. Although it is beyond the scope of this paper, we are aware that many of the practices we have identified would likely find broad empirical support in the undergraduate teaching and learning and college impact literatures.

To begin, several scholars have emphasized the valuable role that doctoral students play in teaching and learning from one another (Berelson, 1960; Boyle and Boice, 1998; Anderson and Swazey, 1998; Katz, 1976). Interestingly, in his survey of over 4,000 faculty and doctoral students in the late 1950s, Berelson found that while 59 percent of students surveyed ranked their "relations with fellow students" as "particularly valuable," only 19 percent of faculty felt similarly. Our research did not produce a similar disconnect; indeed, we spoke with as many faculty as we did students and alumni who emphasized the enriching nature of relational teaching and learning, consistently underscoring the positive effects it had for students' growth and development.

The essential role that mentorship plays in students' doctoral experiences has been repeatedly emphasized by scholars (Anderson and Swazey, 1998; Berelson, 1960; Boyle and Boice, 1998; Hartnett,

1976). And while there is general support for this important practice in the aforementioned studies, our findings contrast with those of Harnett and Nyquist et al., both of whom staked their claims largely on the basis of students' dissatisfaction with their faculty mentors. The vast majority of students we interviewed reported positive, enriching, professional relationships with their major professors.

Previous studies documenting the value of the dissertation to students lend support to the practice of authentic discovery. To be sure, while this practice was inclusive of the dissertation, it also went well beyond it, approximating more closely the construct of "authentic activity" described by Brown, Collins, and Duguid (1989). Nonetheless, our findings are consistent with those of Berelson (1960), Isaac (1990), and Isaac, Quinlan, and Walker (1992), all of whom found that students and faculty viewed the dissertation as a meaningful and valuable learning experience.

We found less support in the doctoral education literature for the practices of problematization of professional knowledge and practice and integrative inquiry. In discussing the intellectual development of graduate students, Katz (1976) recommended that collaborative discussions and research projects were particularly helpful in developing a "broadened, critical awareness in students" (1976, p. 120), although he offered little empirical proof for his claim. Baxter-Magolda's work (1998, 1999), in contrast, strongly supports both of these practices and our findings that problematization and integrative inquiry have powerful effects on students' intellectual development, often producing in them a "cognitive shift" that emphasizes contextualized, critically-reflective thought and an appreciation (and capacity for) informed, reflective professional judgment.

Finally, and as a departure from the doctoral education literature, we believe there is strong support for our findings in recent writings and empirical work on constructivist views of learning (Brown, Collins, and DuGuid, 1989; Fosnot, 1996; Lave, 1988; Lave and Wenger, 1991; Stage, et al., 1998; Steffe and Gale, 1995). According to Stage and her colleagues:

> Theories of cognitive learning that emphasize the active role of learners in building and interpreting their own understandings of reality are considered constructivist . . . [this] view of learning rests on the assumption that knowledge is constructed by learners as they attempt to make sense of their environments. The notion that learners must interpret and transform complex information if they are to understand it is the essence of constructivism. The metaphor of carpentry or architecture can be used to portray

> constructivism's emphasis on a dynamic process of developing understanding through building, shaping and configuring meaning. The learner actively builds knowledge. Learning is the result of ongoing modifications in our mental frameworks as we attempt to make meaning out of our experiences. (1999, pp. 34-5)

Educators whose teaching is informed by constructivist learning theory tend to emphasize a number of pedagogical and curricular practices that, we believe, lend support to the five practices we identified in our data set. These include cooperative and collaborative peer learning (largely equivalent to "relational teaching and learning"); shared responsibility among teachers and learners for constructing knowledge within a "community of discourse" through which multiple perspectives on knowledge and meaning are contested, negotiated, and mediated (Fosnot, 1996, p. 29) (similar to "problematization of professional knowledge and practice"); the use of "challenging, open-ended investigations in realistic, meaningful contexts" that provide students with "authentic" opportunities to "explore and generate" many possible solutions to problems (and often confront and deal with failure constructively) (Fosnot, 1996, p. 30; Brown, Collins, and DuGuid, 1989, p. 38) (comparable to "integrative inquiry" and "authentic discovery"), and "enculturation" of students into their respective disciplinary or professional "communities of practice," often through a "cognitive apprenticeship" with a more experienced person in the field (Brown, Collins, and DuGuid, 1989, p. 39) (reflective of "mentoring" and "authentic discovery").

While there is broad, general support for the five practices we have identified in the doctoral education and social constructivist literatures, it is important to emphasize that only a handful of these studies explain why certain practices "make a difference" in terms of their impact on students' learning and development.[6] Indeed, too much of the extant body of research on cultural, instructional, and curricular practices in doctoral education is descriptive, offering few analytical insights into why these practices "really matter." Although our research begins to fill that void, additional empirical research is needed on how different practices internal to programs enrich or diminish students' doctoral experiences and affect their learning and development. Research of this sort has clear implications for those committed to studying the nature and quality of doctoral education, as well as for those tasked with the responsibility of assessing and improving doctoral programs.

We conclude with three quotations that, at least in our minds, suggest that our efforts to understand how various practices affect students' doctoral experiences and contribute to their growth and development may be "on the right track." Each offers confirmation of an observation Katz made more than 25 years ago: namely, that "[al]though the impact of graduate education on sense of self is profound, at this time neither professors nor programs take adequate cognizance of it" (1976, pp. 124-25). The following comments were made by two program administrators and an alumna in three separate programs located at three distinct institutions in three different regions of the country:

> [Brooks University Program Administrator]: Change is what it [doctoral study] is all about. Knowledge is power and it should make you different . . .
>
> [Interviewer]: Is growth -- that change -- in students valued by faculty?
>
> [Brooks University Program Administrator]: Absolutely. We don't have enough time to engage in any scholarly discussions about that [however].
>
> ***
>
> [State Alumna]: Doctoral education should be a place where something very dramatic happens in terms of how you start to think about yourself and about your contribution. . . . [And] this is what we don't do in doctoral education: [we don't] really sit down and start to look at, "What does it mean for the student to be at the center of the learning experience? What do doctorally-prepared persons really have to do with what they know when they get out of here? . . . . What kinds of communication skills, analytic skills, problem-solving skills . . . do they have to have so that they can work in collaborative teams, interdisciplinary teams? . . . And what kind of commitment does that mean they need to have to society in a different way because of their preparation? What responsibilities does that bring for them? We don't spend time thinking about that in doctoral programs.
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> ***
>
> [Frontier University Program Administrator]: I want somebody to study this program. I think some students leave with more than we know about. I really think they do; I would bet money on it. . . . But what contributes to that change between point A and point C – I can't really say.

Endnotes

1. In a comprehensive review of the literature on doctoral programs in the United States (Haworth, 1996), one of us observed that most of our understandings of what doctoral programs are and should be have been normed on scholarly investigations of traditional arts and sciences programs, largely in highly-visible, Research I universities. While informative, these studies provide only a partial view of doctoral education in our nation's colleges and universities. In 1996, for example, approximately 60 percent of the nation's doctoral recipients earned their degrees in professional and interdisciplinary fields (such as psychology, engineering, education, and environmental sciences); up from 43 percent in 1972. Moreover, in 1989, the nation's top fifty universities in terms of doctoral production awarded slightly more than one-half of the nation's doctorates while 408 other colleges and universities made up the difference. Interestingly, despite this growth and diversification (as well as other recent changes in the doctoral enterprise, including changes in the job market for graduates), a comprehensive, multi-institutional, cross-disciplinary investigation of doctoral education in the professions has not been conducted in several decades.

2. Interestingly, while Nyquist et al.'s study included several professional fields (business, education, engineering, journalism, and psychology), their 1999 article seldom highlights interviewee accounts from these fields, with the notable exception of business, nor do the authors indicate if field-related differences existed in the types of experiences interviewees reported.

3. We concentrated on the professional fields of clinical psychology, electrical and computer engineering, nursing, and school administration in our study for three reasons. First, each offers viable professional career options in the non-university workplace (e.g., research and development careers in industry and government; administrative leadership positions in K-12 education, health care, and industrial settings; and expert clinician roles in private practice, health care, and social service organizations). Second, three of the four fields included place at least 50 percent of their Ph.D. graduates in non-faculty, professional positions (in nursing, the percentage is lower, owing to strong demand need for Ph.D. prepared nurses in academe). Third, each of these professional fields produces a significant number of doctoral recipients annually. In 1995, educational administration (1,918 degrees), electrical engineering (1,513 degrees), and clinical psychology (1,292 degrees) ranked first, second, and third among all professional fields in doctoral degree production, with nursing ranking 12th (behind five engineering sub-specialties, counseling psychology, higher education administration, and business administration).

4. Since August, 1999, we have completed three additional site visits, and a fourth is scheduled for December, 2000. Because we have not yet systematically coded and analyzed data from these three additional cases (one each in clinical psychology, engineering, and school administration), we chose to exclude data from these programs in this particular paper.

5. This is largely attributable to our use of various purposive sampling techniques, limited travel funds, and an inability to gain access to certain institutions (most notably institutions in clinical psychology).

6. Baxter-Magolda's work is an exception. Although she relates certain practices within graduate programs to students' intellectual development, her primary focus is on the latter rather than the former.

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